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Late gadolinium enhancement patterns on cardiac magnetic resonance images in heart transplant patients

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Introduction

Non-invasive monitoring of patients with heart transplant (HTX) is still unsatisfactory. Cardiac magnetic resonance (CMR) has emerged as a useful modality for accurately recognizing myocardial areas with late gadolinium enhancement (LGE) as an expression of altered tissue composition. Limited information are currently available about the presence and significance of myocardial LGE in HTX patients.

Purpose

To assess the prevalence and distribution of myocardial LGE on CMR images in HTX patients.

Methods

The study population included a group of 22 HTX patients (mean age, 51.0 ± 16.5 years; mean ischemia time of HTX, 160.0 ± 47.4 min) with >1 year of follow-up. Routine endomyocardial biopsies have been performed during follow-up in all patients based on a standardized schedule. Previous significant HTX rejection was documented in 7 patients. Patients with clinical and instrumental evidence of myocardial ischemia underwent invasive angiography to exclude transplant coronary artery disease (TCAD). Manifest TCAD was described in 8 patients. CMR exams were performed on a 1.5 T scanner. The study protocol included the acquisition of steady-state free precession cines in the standard planes covering the left ventricle (LV) and right ventricle (RV), followed by the acquisition of LGE segmented inversion-recovery gradient echo images in matching planes (starting 10 min after i.v. injection of gadolinium-DTPA, 0.15 mmol/kg). LGE extension was calculated by planimetry in all short-axis slices and the total volume of LGE was expressed as a percentage of total myocardium (LGE%).

Results

Areas of myocardial LGE were detected in 18 (82%) patients. LGE with a typical ischemic-related pattern was observed in 4 patients (TCAD was demonstrated in all of them by angiography), while the remaining patients (n = 14) presented with non ischemic-related patterns [frequently involving the interventricular septal junctions (n = 5) or the entire LV with a diffuse infiltrative pattern (n = 5)]. In addition, 7 patients presented LGE also involving the RV myocardium. LGE% showed a significant inverse correlation with LV ejection fraction ($r = -0.66$, $p = 0.014$) and RV ejection fraction ($r = -0.64$, $p = 0.018$). A multivariate analysis including age, ischemia time of HTX, HTX-CMR time-interval, TCAD, previous rejections, selected the ischemia time of HTX as the only significant predictor of LGE% (beta = 1.10, $p < 0.05$).

Conclusion

At a late post-HTX evaluation by CMR, myocardial LGE is highly prevalent and is more frequently observed with non ischemic-related patterns of distribution. The ischemia time of HTX was a significant predictor of LGE

extension and this correlates with the ventricular systolic function.

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